REMARKS

This is intended as a full and complete response to the Office Action dated February 25, 2003, having a shortened statutory period for response set to expire on May 25, 2003. Claims 30-44 and 59-70 are pending in this application. Claims 30-44 and 59-60, 65-70 were considered and stand rejected. Claims 61-64 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Claim 30 was amended to include the subject matter of claim 61. Claim 63 has been rewritten in independent form. Claims 39, 40, 41, 44, 59, 61, 62, 64 and 70 have been amended. Applicants believe that no new matter has been introduced in this response.

Claims 30-44, 59-60, and 65-70 are rejected under 35 U.S.C.§ 103(a) as being unpatentable over *Avanzino et. al.* (6,184.141) further in view of *Chopra* (6,276,996). The Examiner asserts that it would have been obvious to one skilled in the art to use the fixed abrasive linear belt in combination with the CMP slurry as taught by *Chopra* in the process of *Avanzino et al.* Applicants respectfully respond to the rejection.

Avanzino et al. discloses polishing with an abrasive slurry at a first removal rate and a second removal rate slower than the first rate. *Chopra* discloses abrasive-free compositions adapted for polishing substrates with fixed-abrasive polishing pads.

The combination of *Avanzino et al.* and *Chopra* does not teach, show, or suggest a method of planarizing a substrate surface containing a copper or copper alloy layer disposed on a barrier layer comprising polishing the substrate surface on a first platen with a first polishing composition to reduce a copper or copper alloy layer at a first removal rate, wherein the first polishing composition comprises about 1 wt.% to about 10 wt.% of an oxidizer, about 0.05 wt.% to about 0.20 wt.% of an inhibitor, about 1.0 wt.% to about 5.0 wt.% of a first chelating agent, about 3.0 wt.% to about 15.0 wt.% of a second chelating agent, and deionized water, and polishing the substrate on a second platen with a second polishing composition to remove the copper or copper alloy layer at a second removal rate less than the first removal rate, as recited in claim 30 and claims dependent thereon.

The combination of *Avanzino et al.* and *Chopra* does not teach, show, or suggest a method of planarizing a wafer surface, comprising a step for removing a

portion of a copper containing material with a first polishing composition at a first removal rate, wherein the first polishing composition comprises about 0.05 wt.% to about 0.2 wt.% of an inhibitor and a step for selectively removing a copper containing material with a second polishing composition at a second removal rate less than the first removal rate, wherein the second polishing composition comprises about 0.5 wt.% to about 1.0 wt.% of an inhibitor, as recited in claim 59 and claims dependent thereon.

The combination of *Avanzino et al.* and *Chopra* does not teach, show, or suggest a method of planarizing a substrate surface containing a copper or copper alloy layer disposed on a barrier layer comprising polishing the substrate surface on a first platen with a first polishing composition to reduce a copper or copper alloy layer at a first removal rate and polishing the substrate on a second platen with a second polishing composition to remove the copper or copper alloy layer at a second removal rate less than the first removal rate, wherein the second polishing composition comprises about 0.05 wt.% to about 6.0 wt.% of an oxidizer, about 0.03 wt.% to about 0.15 wt.% of an inhibitor, about 0.5 wt.% to about 2.0 wt.% of a first chelating agent, about 1.0 wt.% to about 6 wt.% of a second chelating agent, and deionized water, as recited in claim 63 and claims dependent thereon. Withdrawal of the rejection is respectfully requested.

Claims 30-44, 59-60, and 65-70 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the references as applied above further in view of the teachings of *Seiichi et. al.* (JP 11-040,526). The Examiner asserts that it would have been obvious to one skilled in the art to use the fixed abrasive linear belt in combination with the CMP slurry as taught by *Chopra* in the process of *Avanzino et al.* and to perform an in-situ rinse of a cmp abrasive belt used to polish each layer in the process as taught in *Seiichi et al.* Applicants respectfully respond to the rejection.

Avanzino et al. and *Chopra* are described above. *Seiichi et al.* discloses disposing an anti-corrosive liquid on substrate following a polishing process.

The combination of *Avanzino et al. Chopra,* and *Seiichi et al.* does not teach, show, or suggest a method of planarizing a substrate surface containing a copper or copper alloy layer disposed on a barrier layer comprising polishing the substrate surface on a first platen with a first polishing composition to reduce a copper or copper alloy layer at a first removal rate, wherein the first polishing composition comprises about 1 wt.% to about 10

wt.% of an oxidizer, about 0.05 wt.% to about 0.20 wt.% of an inhibitor, about 1.0 wt.% to about 5.0 wt.% of a first chelating agent, about 3.0 wt.% to about 15.0 wt.% of a second chelating agent, and deionized water, and polishing the substrate on a second platen with a second polishing composition to remove the copper or copper alloy layer at a second removal rate less than the first removal rate, as recited in claim 30 and claims dependent thereon.

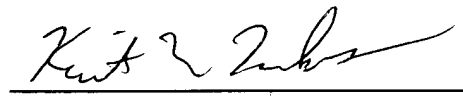
The combination of *Avanzino et al. Chopra,* and *Seiichi et al.* does not teach, show, or suggest a method of planarizing a wafer surface, comprising a step for removing a portion of a copper containing material with a first polishing composition at a first removal rate, wherein the first polishing composition comprises about 0.05 wt.% to about 0.2 wt.% of an inhibitor and a step for selectively removing a copper containing material with a second polishing composition at a second removal rate less than the first removal rate, wherein the second polishing composition comprises about 0.5 wt.% to about 1.0 wt.% of an inhibitor, as recited in claim 59 and claims dependent thereon.

The combination of *Avanzino et al. Chopra,* and *Seiichi et al.* does not teach, show, or suggest a method of planarizing a substrate surface containing a copper or copper alloy layer disposed on a barrier layer comprising polishing the substrate surface on a first platen with a first polishing composition to reduce a copper or copper alloy layer at a first removal rate and polishing the substrate on a second platen with a second polishing composition to remove the copper or copper alloy layer at a second removal rate less than the first removal rate, wherein the second polishing composition comprises about 0.05 wt.% to about 6.0 wt.% of an oxidizer, about 0.03 wt.% to about 0.15 wt.% of an inhibitor, about 0.5 wt.% to about 2.0 wt.% of a first chelating agent, about 1.0 wt.% to about 6 wt.% of a second chelating agent, and deionized water, as recited in claim 63 and claims dependent thereon. Withdrawal of the rejection is respectfully requested.

The prior art made of record is noted. However, it is believed that the secondary references are no more pertinent to the Applicants' disclosure than the primary references cited in the office action. Therefore, it is believed that a detailed discussion of the secondary references is not deemed necessary for a full and complete response to this office action. Accordingly, allowance of the claims is respectfully requested.

In conclusion, the references cited by the Examiner, neither alone nor in combination, teach, show, or suggest the claimed aspects of the invention. Having addressed all issues set out in the office action, applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

30. (Twice Amended) A method of planarizing a substrate surface containing a copper or copper alloy layer disposed on a barrier layer comprising:

(a) polishing the substrate surface on a first platen with a first [abrasive-free] polishing composition to reduce a copper or copper alloy layer at a first removal rate, wherein the first polishing composition comprises:

about 1 wt.% to about 10 wt.% of an oxidizer;

about 0.05 wt.% to about 0.20 wt.% of an inhibitor;

about 1.0 wt.% to about 5.0 wt.% of a first chelating agent;

about 3.0 wt.% to about 15.0 wt.% of a second chelating agent;

and deionized water; and

(b) polishing the substrate on a second platen with a second [abrasive-free] polishing composition to remove the copper or copper alloy layer at a second removal rate less than the first removal rate.

39. (Amended) The method according to claim 30, further comprising recycling the first [abrasive-free] polishing composition, the second [abrasive-free] polishing composition, or both.

40. (Amended) The method according to claim 36, wherein the first [abrasive-free] polishing composition is delivered to the first platen at a flow rate of about 300 milliliters per minute or greater and the second [abrasive-free] polishing composition is delivered to the second platen at a flow rate of about 300 milliliters per minute or greater.

41. (Amended) The method according to claim 36, wherein the static removal rate of the copper or copper alloy by the first [abrasive-free] polishing composition and the second [abrasive-free] polishing composition is about 150 Å per minute or less.

44. (Amended) The method according to claim 36, further comprising:

exposing the first polishing pad or the substrate surface to an inhibitor after polishing at the first removal rate and prior to polishing at the second removal rate;

exposing the second polishing pad or the substrate surface to an inhibitor after polishing at the second removal rate; and

recycling the first [abrasive-free] polishing composition, the second [abrasive-free] polishing composition, or both.

59. (Twice Amended) A method of planarizing a wafer surface, comprising:

[a step for] removing a portion of a copper containing material with a first [abrasive-free] polishing composition at a first removal rate, wherein the first polishing composition comprises about 0.05 wt.% to about 0.2 wt.% of an inhibitor; and

[a step for] selectively removing a copper containing material with a second [abrasive-free] polishing composition at a second removal rate less than the first removal rate, wherein the second polishing composition comprises about 0.5 wt.% to about 1.0 wt.% of an inhibitor.

61. (Amended) The method of claim 30, wherein the first [abrasive-free] polishing composition [comprises:

about 1 wt.% to about 10 wt.% of an oxidizer;

about 0.05 wt.% to about 0.20 wt.% of an inhibitor;

about 1.0 wt.% to about 5.0 wt.% of a first chelating agent;

about 3.0 wt.% to about 15.0 wt.% of a second chelating agent;

and deionized water] comprises an abrasive-free polishing composition.

62. (Amended) The method of claim 61, wherein the first [abrasive-free] polishing composition comprises:

about 6 wt.% of hydrogen peroxide;

about 0.15 wt.% of 5-methyl benzotriazole;

about 3 wt.% of iminodiaetic acid;

about 9.0 wt.% of ammonium hydrogen phosphate; and

deionized water.

63. (Amended) [The method of claim 30,] A method of planarizing a substrate surface containing a copper or copper alloy layer disposed on a barrier layer comprising:

(a) polishing the substrate surface on a first platen with a first polishing composition to reduce a copper or copper alloy layer at a first removal rate; and

(b) polishing the substrate on a second platen with a second polishing composition to remove the copper or copper alloy layer at a second removal rate less than the first removal rate, wherein the second [abrasive-free] polishing composition comprises:

about 0.05 wt.% to about 6.0 wt.% of an oxidizer;
about 0.03 wt.% to about 0.15 wt.% of an inhibitor;
about 0.5 wt.% to about 2.0 wt.% of a first chelating agent;
about 1.0 wt.% to about 6 wt.% of a second chelating agent; and
deionized water.

64. (Amended) The method of claim 63, wherein the second [abrasive-free] polishing composition [comprises] is an abrasive-free polishing composition comprising:

about 3 wt.% of hydrogen peroxide;
about 0.06 wt.% of 5-methyl-benzotriazole;
about 1.0 wt.% of iminodiacetic acid;
about 3 wt.% of ammonium hydrogen phosphate; and
deionized water.

70. (Amended) The method of claim 30, wherein the first abrasive free polishing composition comprises a corrosion inhibitor concentration between about 0.05 wt.% and about 0.20 wt.% and the second fixed abrasive polishing composition has a corrosion inhibitor concentration between about 0.5 wt.% and about 1.0 wt.%